

Diagenetic to very low-grade metamorphic evolution of kaolin minerals in feldspar-poor, Permo-Triassic sandstones and mudrocks from SE Iberian Range, Spain

*J.D. Martín-Martín*¹, *S. Morad*², *R. Salas*³, *D. Gómez-Gras*¹ and *T. Sanfeliu*⁴

¹ Unitat de Petrologia i Geoquímica, Facultat de Ciències. Universitat Autònoma de Barcelona. 08193 Bellaterra. Spain.

² Department of Earth Sciences. Uppsala University. SE-75236 Uppsala. Sweden.

³ Departament de Geoquímica, Petrologia i Prospecció Geològica. Universitat de Barcelona. 08028 Barcelona. Spain.

⁴ Departament de Ciències Experimentals. Universitat Jaume I. 12080 Castellón. Spain.

The distribution of kaolin minerals in clastic sedimentary rocks can give clues to the paleoclimatic conditions and burial-thermal evolution of sedimentary basins. The Late Permian marginal deposits of the eastern Iberian basin is typically characterised by the clay mineral assemblage illite±dickite±kaolinite±I/S±C/S. Dickite, which is abundant in sandstones, was formed by the transformation of early diagenetic kaolinite and/or directly by alteration of mica grains. Conversely, the mudrocks contain dickite only in the coarsest size fraction and is suggested to have been formed by conversion of expanded and kaolinitized mica. The slight to absent illitization of kaolin minerals is attributed to the lack of a major source of K⁺, which is typically detrital K-feldspars.

Very low-grade metamorphic conditions are inferred for the Late Permian sequence of the basin depocenter, which resulted in the illite±pyrophyllite±sудоite assemblage (Martín-Martín, 2004, Martín-Martín et al., 2006). Textural observations of sandstones indicate that pyrophyllite and sudoite have been formed by replacement of kaolin minerals, presumably dickite (Ruiz-Cruz et al., 2005). The paragenetically latest alteration event in the sandstones includes partial illitization of sudoite. In mudrocks, pyrophyllite has been formed mostly by the replacement of expanded and kaolinitized mica grains, whereas sudoite is nearly absent.

Reported late diagenetic and low-grade metamorphic alterations are attributed to high paleogeothermal gradients during the Late Cretaceous post-rift stage of the basin (Salas et al., 2005). Results of this work indicate that the transition from diagenetic to metamorphic conditions in dickite-bearing rocks promotes the replacement of dickite by pyrophyllite and/or sudoite. The availability of K⁺, probably related to the onset of the Alpine orogeny, would cause extensive illitization of the assemblage.

References

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